REMARKS

This amendment is responsive to the Office Action of April 3, 2008. Reconsideration and allowance of claims 1-13 and 15-21 are requested.

The Office Action

Claims 1-18 stand rejected under 35 U.S.C. § 102 as being anticipated by Kellman (US 7,154,268).

General Discussion

Gonzales Ballester (US 6,949,928; US 2004/0070394) cited in the first Office Action describes how to analyze a reference image in order to determine sensitivity maps for each of a plurality of coil elements for parallel imaging techniques such as SENSE. **Kellman** explains to the reader that one does not operate on the intermediate images from each SENSE channel directly with the sensitivity matrix **S**. Rather, one operates on the intermediate images **201, 202, 203, 204** with an unmixing matrix **U 306** in order to generate the final image **104**. A primary component of the unmixing matrix **U** is the sensitivity matrix **S** (column 4, line 42 – column 5, line 5).

Kellman further tells the reader that the elements of the sensitivity matrix are typically not perfect representations of the actual sensitivities of the coils (column 5, lines 20-21). The solution to these imperfections and the defects they cause in the resultant images is corrected by Kellman in an iterative adjustment process which adaptively corrects the unmixing matrix **U** with an iteratively adjusted regularization matrix **A** (column 7, lines 38-55). The iterative correction process is explained by Kellman in conjunction with Figure 4, particularly boxes **406, 408,** and **410**. Once the unmixing matrix **U** is optimized, it is used to combine the intermediate images **205-208** into the final image **104**.

The present application is directed to a different method and apparatus which function in a different way to achieve a different end result. The present method and apparatus can be used with or without the optimized unmixing matrix of Kellman and, conversely, the optimized unmixing matrix of Kellman can be utilized in conjunction with the present method and apparatus, or in others.

Typically, there is a tradeoff in various scan parameters such as image noise, scan time, image resolution, image volume, and the like. That is, to improve one of the scan parameters, it is often necessary to compromise on another. The amount of image noise can be reduced, for example, by selecting a scan parameter set which controls the scanner to perform a longer scan. On the other hand, one can optimize or minimize scan time, but often at the cost of more image noise. A scanner has numerous scan parameter sets, each of which can control the scanner to produce a different scan with different scan parameters. The operator sets a target value for one of the scan parameters, e.g., image noise, and a process is performed to determine which one of the scan parameter sets will generate images which meet the specified scan parameter, e.g., the specified amount of image noise, while optimizing other scan parameters, e.g., minimizing imaging time. The optimum scan parameter set is used to control the scanner to perform an imaging or scanning sequence which meets the target value and optimizes other scan parameters. The selected imaging or scan sequence may or may not be one which uses the Kellman optimized unmixing matrix **U**.

<u>The Claims Distinguish Patentably Over the References of Record</u>

Claim 1 calls for providing a target value for a specific scan parameter. By contrast, Kellman performs an iterative process to optimize an unmixing matrix **U**. No target value for a scan parameter is provided.

Claim 1 further calls for determining an optimum scan parameter set. Kellman does not disclose or fairly suggest determining an optimum scan parameter set. Rather, it appears that the Kellman optimized unmixing matrix **U** would be used in all of the scan parameter sets which control the scanner to perform a SENSE type imaging sequence.

Accordingly, it is submitted that **claim 1 and claims 2-9 11, 19, and 20 dependent therefrom** are not anticipated by Kellman.

Claim 4 calls for the specific scan parameter to be scan time. Kellman does not disclose determining a scan parameter set according to a target value for scan time.

Claim 5 calls for the specific scan parameter to be the signal-to-noise ratio. Kellman does not disclose selecting a scan parameter set based on a target signal-to-noise ratio.

Claim 6 calls for determining image noise for a number of scan parameter sets in order to determine the optimum scan parameter set. Kellman does not select a scan parameter set by determining image noise for a number of scan parameter sets.

Claim 7 calls for the predetermined scan parameter sets to include sets with different orientations of a phase-encode direction. Kellman does not disclose determining image noise for different orientations of the phase encode direction.

Claim 8 calls for the predetermined scan parameter sets to include sets with different rectangular fields-of-view. Kellman does not address parameter sets with different rectangular fields-of-view.

Claim 9 calls for automatically performing a scan using the determined optimum scan parameter data set. Kellman performs a scan, but does not disclose determining an optimal one of the scan parameter sets to be utilized.

Claim 19 calls for the determining step to include determining which of a plurality of scan parameter sets both meets the target value for the specific scan parameter and optimizes at least one additional scan parameter. Kellman does not disclose selecting among a plurality of scan parameter sets, much less selecting a scan parameter set which meets the target value for the specific scan parameter and optimizes at least one additional scan parameter.

Claim 20 calls for the specific scan parameter to be one of rectangular field of view percentage, signal to noise ratio, image noise, and scan time. While the additional scan parameter includes at least a different one of the rectangular field of view percentage, signal to noise ratio, image noise, and scan time. Kellman does not disclose picking a scan parameter set which meets one of the rectangular field of view percentage, the signal to noise ratio, the image noise, or the scan time, much less one that also optimizes at least one other of the rectangular field of view percentage, the signal to noise ratio, the image noise, and the scan time.

Accordingly, it is submitted that **claims 1-9, 11, 19, and 20** are not anticipated by and distinguish patentably over Kellman.

Claim 10 calls for an operating device which provides a target value of a specific scan parameter. Kellman does not disclose providing a target value for a specific scan parameter.

Claim 10 further calls for a control device which determines one or more of a plurality of scan parameter set which meets the target value of a specific scan parameter and optimizes a second scan parameter. Claim 10 further calls for the second scan parameter to be scan time. Kellman does not disclose optimizing scan time.

Accordingly, it is submitted that **claim 10 and claim 21 dependent therefrom** are not anticipated by Kellman.

Claim 12 calls for selecting a target value for a selected scan criterion, the selected scan criterion being one of signal to noise ratio and scan time. Kellman does not disclose selecting a target value for a signal to noise ratio or a scan time.

Claim 12 further calls for analyzing a reference scan to determine which of a plurality of sets of scan parameters (1) meet the signal to noise or the scan time target value and (2) optimize the other of the signal to noise ratio and the scan time. Kellman does not suggest selecting a scan data set based on tradeoffs between scan time and signal to noise ratio, much less selecting a target level for one and optimizing the other.

Accordingly, it is submitted that **claim 12 and claims 13 and 15-18** are not anticipated by Kellman.

CONCLUSION

For the reasons set forth above, it is submitted that claims 1-13 and 15-21 are not anticipated by Kellman and distinguish patentably over the references of record. An early allowance of all claims is requested.

In the event the Examiner considers personal contact advantageous to the disposition of this case, she is requested to telephone Thomas Kocovsky at (216) 861-5582.

Respectfully submitted,

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